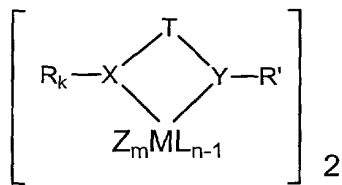
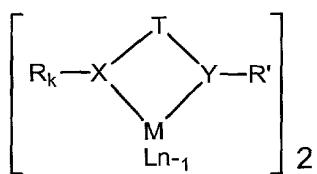
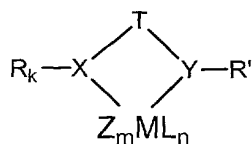
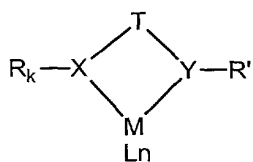


**CLAIMS:**

1. A catalyst precursor composition selected from the group consisting of those represented by:



wherein T is a bridging group containing 2 or more bridging atoms;

M is a metallic element selected from Groups 1 to 15 and the Lanthanide series of the Periodic Table of the Elements;

Z is a coordination ligand;

each L is a monovalent, bivalent, or trivalent anionic ligand;

n is an integer from 1 to 6;

m is an integer from 1 to 3;

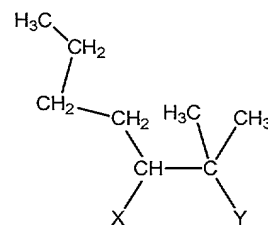
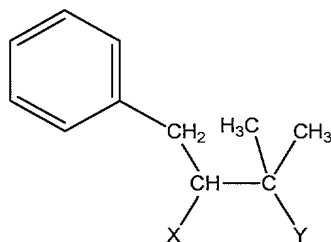
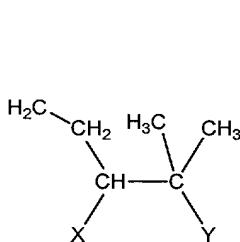
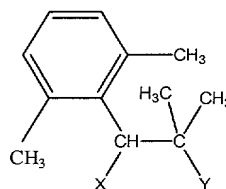
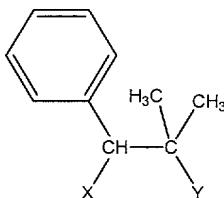
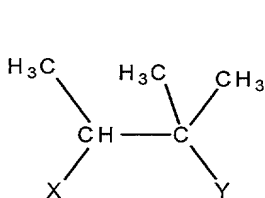
k has the value of 2 when X is nitrogen or phosphorus, and k has the value of 1 when X is oxygen or sulfur;

X and Y are heteroatoms each independently selected from nitrogen, phosphorus, oxygen or sulfur;

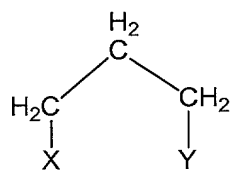
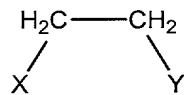
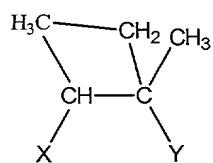
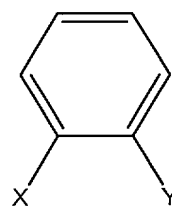
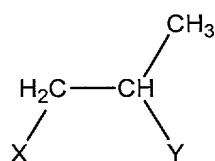
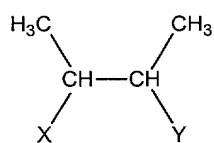
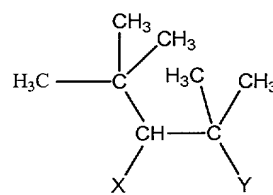
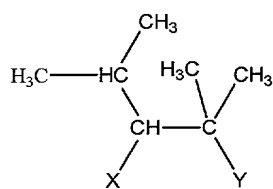
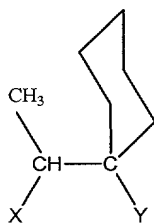
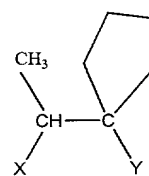
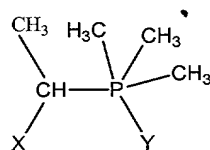
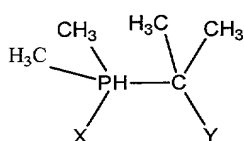
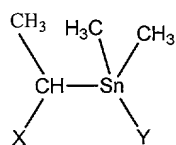
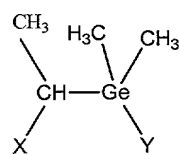
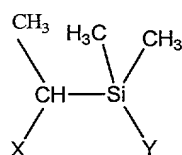
R is a non-bulky substituent that has relatively low steric hindrance with respect to the X substituent and is a straight or branched chain alkyl group; and

R' is a bulky substituent with respect to Y and is selected from alkyl, alkenyl, cycloalkyl, heterocyclic (both heteroalkyl and heteroaryl), alkylaryl, arylalkyl, and polymeric groups.

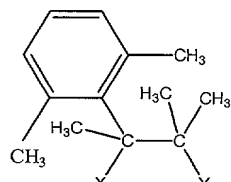
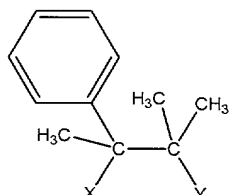
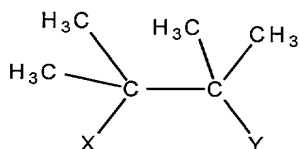
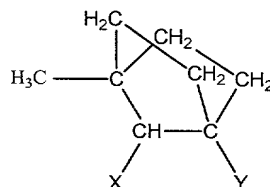
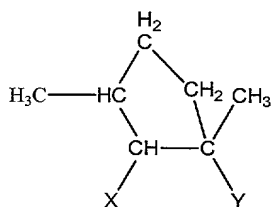
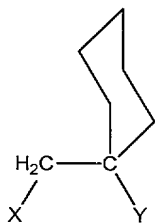
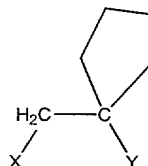
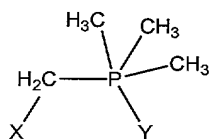
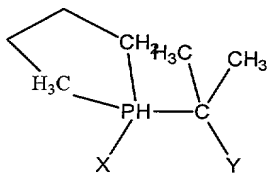
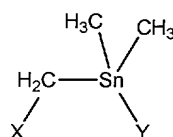
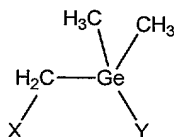
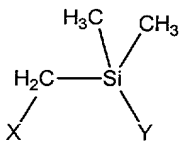
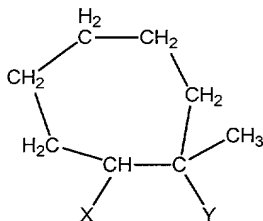
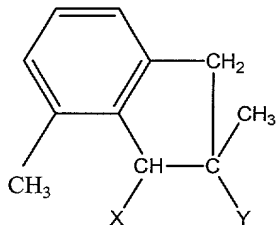
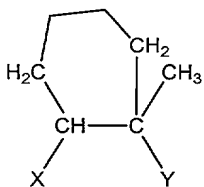
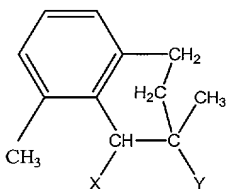
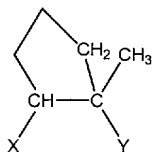
2. The catalyst precursor composition of claim 1 wherein at least one of the bridging atoms of T is a carbon atom and wherein T contains from about 1 to 50 non-hydrogen atoms.
3. The catalyst precursor composition of claim 1 wherein T contains a dimethyl group adjacent to Y.
4. The catalyst precursor composition of claim 1 wherein T is selected from the group consisting of:



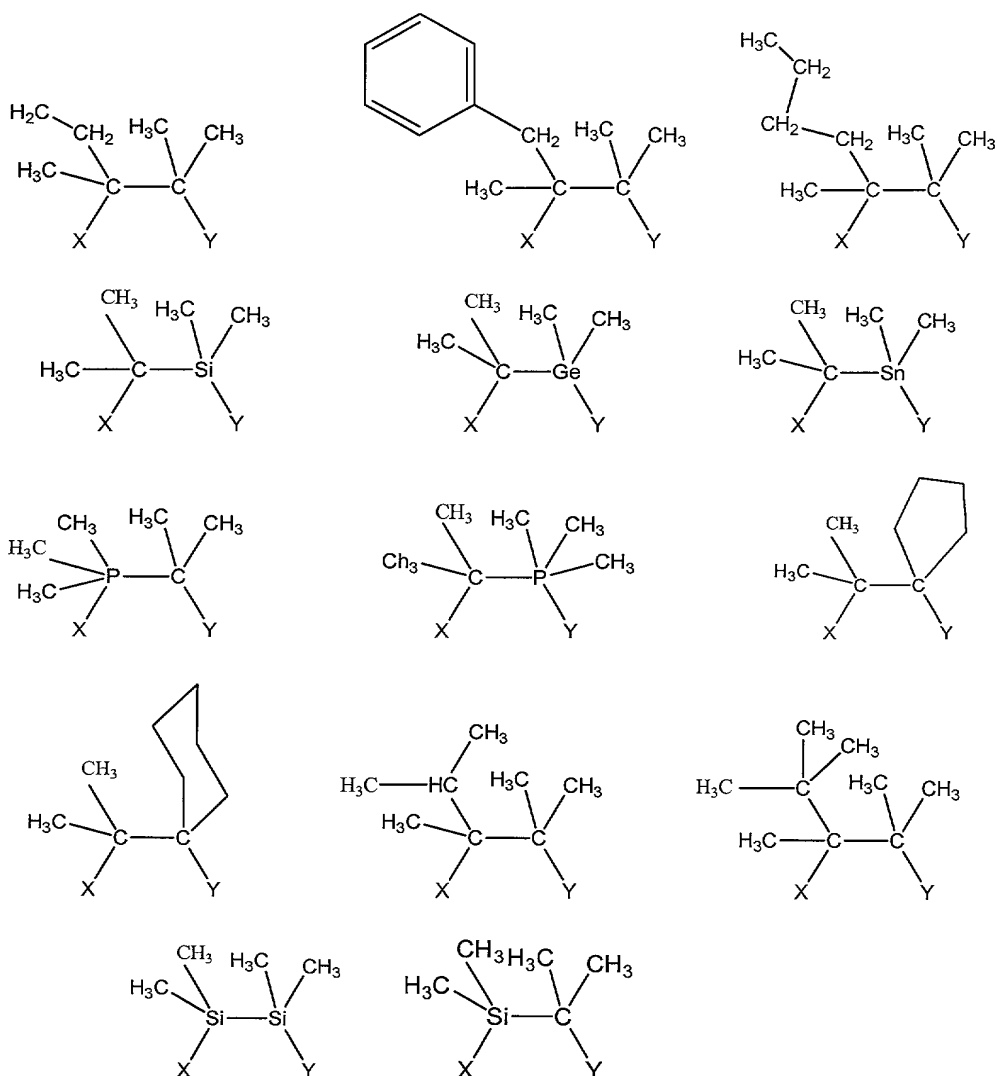
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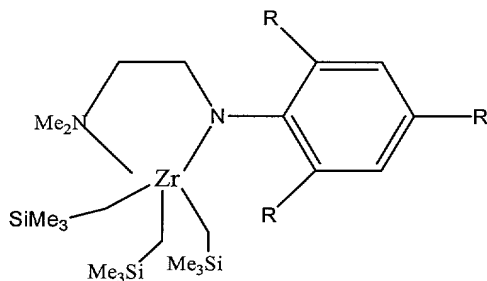


wherein X and Y are provided for convenience and are not part of the bridging group.

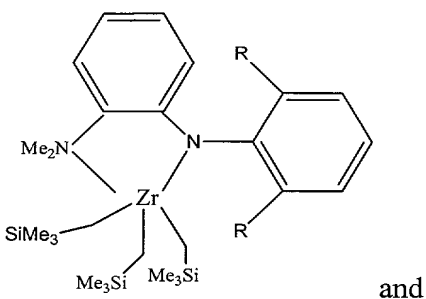
5. The catalyst precursor composition of claim 1 wherein Z is selected from at least one of triphenylphosphine, tris( $C_1$ - $C_6$  alkyl) phosphine, tricycloalkyl phosphine, diphenyl alkyl phosphine, dialkyl phenyl phosphine, trialkylamine, arylamine, a substituted or unsubstituted  $C_2$  to  $C_{20}$  alkene, an ester group, a  $C_1$  to  $C_4$  alkoxy group, an amine group, carboxylic acid, and di( $C_1$  to  $C_3$ ) alkyl ether, an  $\eta^4$ -diene, tetrahydrofuran, and a nitrile.

6. The catalyst precursor composition of claim 1 wherein each L is an anionic ligand independently selected from those containing from about 1 to 50 non-hydrogen atoms and selected from the group consisting of halogen containing groups; hydrogen; alkyl; aryl; alkenyl; alkylaryl; arylalkyl; hydrocarboxy; amides, phosphides; sulfides; silyalkyls; diketones; borohydrides; and carboxylates.
7. The catalyst precursor composition of claim 1 wherein each L is an anionic ligand independently selected from those containing from about 1 to 20 non-hydrogen atoms and selected from the group consisting of alkyl, arylalkyl, and halogen containing groups.
8. The catalyst precursor composition of claim 1 wherein n is an integer from 1 to 4.
9. The catalyst precursor composition of claim 1 wherein both X and Y are nitrogen.
10. The catalyst precursor composition of claim 1 wherein R is a non-bulky substituent selected from straight and branched chain alkyl groups.
11. The catalyst precursor composition of claim 10 wherein R is a non-bulky C<sub>1</sub> to C<sub>20</sub> alkyl group.
12. The catalyst precursor composition of claim 11 wherein R is a C<sub>1</sub> to C<sub>10</sub> straight chain alkyl group.
13. The catalyst precursor composition of claim 1 wherein R' is selected from alkyl, alkenyl, cycloalkyl, heterocyclic, alkylaryl, arylalkyl, and polymeric.

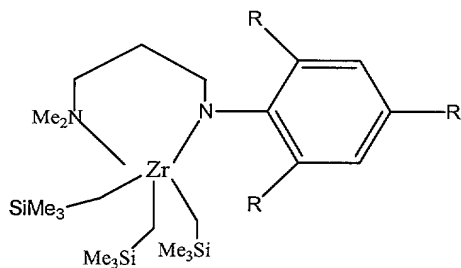
14. The catalyst precursor composition of claim 13 wherein the R' substituent contains from about 3 to 50 non-hydrogen atoms.
15. The catalyst precursor composition of claim 14 wherein the R' substituent has one or more of its carbon or hydrogen positions are substituted with an element selected from Groups 14 to 17 of the Periodic Table of the Elements.
16. The catalyst precursor composition of claim 1 having a formula selected from:



, and

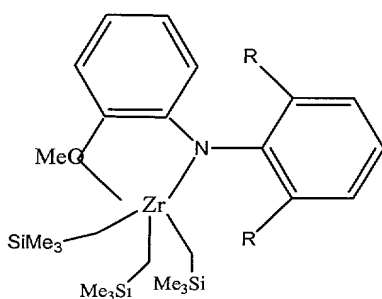
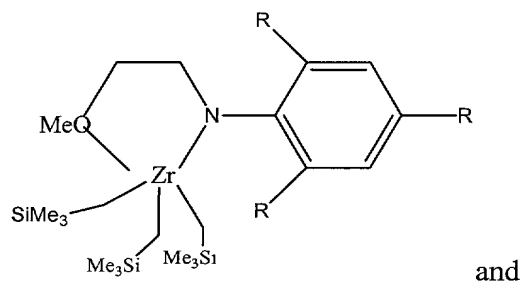


and



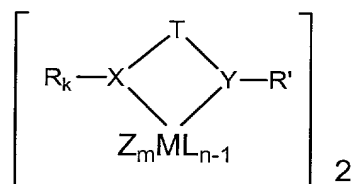
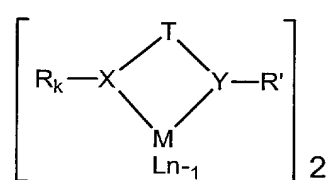
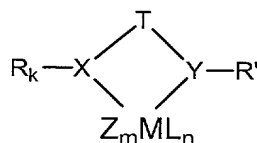
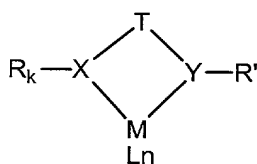
-57-

17. The catalyst precursor composition of claim 1 which is represented by a formula selected from:



18. A catalyst composition comprising:

a) a catalyst precursor selected from the group consisting of those represented by:



wherein T is a bridging group containing 2 or more bridging atoms;



M is a metallic element selected from Groups 1 to 15 and the Lanthanide series of the Periodic Table of the Elements;

Z is a coordination ligand;

each L is a monovalent, bivalent, or trivalent anionic ligand;

n is an integer from 1 to 6;

m is an integer from 1 to 3;

k has the value of 2 when X is nitrogen or phosphorus, and k has the value of 1 when X is oxygen or sulfur;

X and Y are heteroatoms each independently selected from nitrogen, phosphorus, oxygen or sulfur;

R is a non-bulky substituent that has relatively low steric hindrance with respect to the X substituent and is a straight or branched chain alkyl group; and

R' is a bulky substituent with respect to Y and is selected from alkyl, alkenyl, cycloalkyl, heterocyclic (both heteroalkyl and heteroaryl), alkylaryl, arylalkyl, and polymeric groups; and

b) an activating cocatalyst.

19. The catalyst composition of claim 18 wherein at least one of the bridging atoms of T is a carbon atom and wherein T contains from about 1 to 50 non-hydrogen atoms.

20. The catalyst composition of claim 18 wherein T contains a dimethyl group adjacent to Y.

21. The catalyst composition of claim 18 wherein Z is selected from at least one of triphenylphosphine, tris(C<sub>1</sub>-C<sub>6</sub> alkyl) phosphine, tricycloalkyl phosphine, diphenyl alkyl phosphine, dialkyl phenyl phosphine, trialkylamine, arylamine, a substituted or unsubstituted C<sub>2</sub> to C<sub>20</sub> alkene, an ester group, a C<sub>1</sub> to C<sub>4</sub> alkoxy group, an amine

group, carboxylic acid, and di(C<sub>1</sub> to C<sub>3</sub>) alkyl ether, an an  $\eta^4$ -diene, tetrahydrofuran, and a nitrile.

22. The catalyst composition of claim 18 wherein each L is an anionic ligand independently selected from those containing from about 1 to 50 non-hydrogen atoms and selected from the group consisting of halogen containing groups; hydrogen; alkyl; aryl; alkenyl; alkylaryl; arylalkyl; hydrocarboxy; amides, phosphides; sulfides; silyalkyls; diketones; borohydrides; and carboxylates.

23. The catalyst composition of claim 18 wherein each L is an anionic ligand independently selected from those containing from about 1 to 20 non-hydrogen atoms and selected from the group consisting of alkyl, arylalkyl, and halogen containing groups.

24. The catalyst composition of claim 18 wherein n is an integer from 1 to 4.

25. The catalyst composition of claim 18 wherein both X and Y are nitrogen.

26. The catalyst composition of claim 18 wherein R is a non-bulky substituent selected from straight and branched chain alkyl groups.

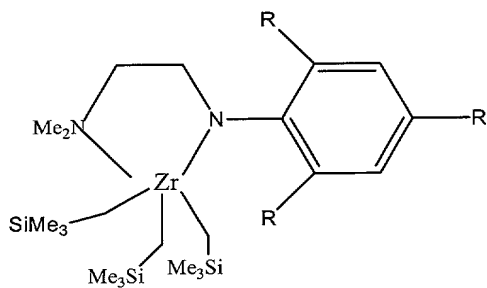
27. The catalyst composition of claim 26 wherein R is a non-bulky C<sub>1</sub> to C<sub>20</sub> alkyl group.

28. The catalyst composition of claim 18 wherein R' is selected from alkyl, alkenyl, cycloalkyl, heterocyclic, alkylaryl, arylalkyl, and polymeric.

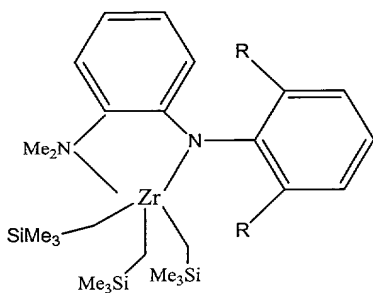
29. The catalyst composition of claim 28 wherein the R' substituent contains from about 3 to 50 non-hydrogen atoms.

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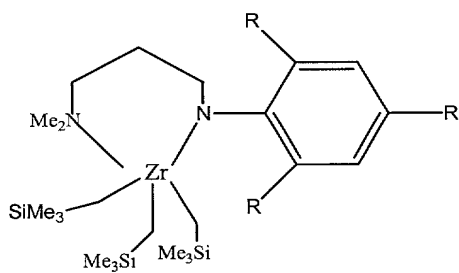
30. The catalyst composition of claim 18 wherein the catalyst precursor has the formula selected from:



, and

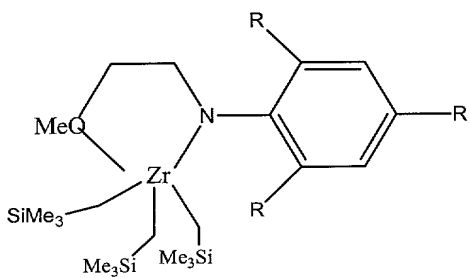


and



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31. The catalyst composition of claim 18 wherein the catalyst precursor has the formula selected from:



and

